“Fitness Solution Using ABC and MAB Algorithm”

Submitted in partial fulfilment of the requirement of University of Mumbai

For the Degree of

Bachelor of Engineering
(Computer Engineering)

By

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Under the guidance of
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April 2018

Declaration

I declare that this written submission represents my ideas in my own words and where others' ideas or words have been included, I have adequately cited and referenced the original sources. I also declare that I have adhered to all principles of academic honesty and integrity and have not misrepresented or fabricated or falsified any idea/data/fact/source in my submission. I understand that any violation of the above will be cause for disciplinary action by the Institute and can also evoke penal action from the sources which have thus not been properly cited or from whom proper permission has not been taken when needed.

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Project Report Approval for B.E.

This project report entitled

“Fitness Solution Using ABC and MAB Algorithm”

By

Akshay Chougule

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Is approved for the degree of ***Bachelor of Engineering in Computer Engineering.***

Internal Examiner

External Examiner

Date: _____

Place: _____

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CERTIFICATE

This is to certify that

Akshay Chougule

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Have satisfactorily completed the requirements of the B.E Project Report

On

"Fitness Solution Using ABC and MAB Algorithm"

*As prescribed by the **University of Mumbai** Under the guidance of*

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ABSTRACT

The project entitled “Fitness Solution Using ABC and MAB Algorithm” recommends a food item list and displays the result depending on the nutritional value of the food item. The Project aims to design proposed system for the users that gives best fitness solutions. The project analyses the food items in database. When the inputs that the user required about are found, in the database of the food items present, they are filtered according to the nutritional value they contain. The amount of calorie that the food contains is taken into consideration here. The suggestion to the user is based on the amount of calories present in the food item. The recommendation is done based on Artificial Bee Colony Algorithm. Most importantly, our proposed system is quick, precise and covers all aspects that would be needed for an ideal fitness recommendation.

Chapter 1

Introduction

The balanced diet not only protects you from health problems but will also give you more energy and happiness. A healthy life requires good diet as well as regular physical activity. Both are vital in the avoidance of disease and also help recover overall mental and physical health. Diets contain saturated fats, put you at risk of cancers and heart disease, whereas a diet rich in vegetables reduce the risk of these diseases and give other benefits also. Sugar, bad fats and processed foods also increase your risk for joint problems, such as arthritis, which is compounded by a lack of exercise, as regular workouts keep the body active. Regular diet consumed everyday should be rich in vegetables, fruits, chicken, fish and whole grains, while exercise should include cardio and strength-training workouts. Generally getting about 30 minutes of physical activity such as walking, biking, yoga or swimming for four or five days a week will help keep you healthy.

Food recommendation is one of the solutions to obtain an optimal nutrition. A good recommendation can be achieved using an appropriate optimization method. For disease-free health appropriate amount of calories should be taken. Calories play an important role in people's diet as more calories in their food can make them gain weight. Also, consumption of high calories diet can have major bad effects on health. [2] In this system, we majorly focus on two initial dimensions of food recommendations: calories intake per day consumed by the person and the calories which are left unused for that person. This analysis proposed food suggestion based on protein, carbohydrate and fat. Using ABC algorithm, we provided food recommendation to obtain balanced nutrition diet.

To obtain ideal diet previous analyst were used Computational Intelligence (CI) method. Computational Intelligence is sub-branch of Artificial Intelligence. Usually, it is used to solve a complex real-world problem such as optimization problem [4]. The most popular optimization techniques are ABC (Artificial Bee Colony), MAB (Multi-Arm Bandit). MAB formulation is basically here used to show maximization of calorie loss while ensuring suggestions are easy to adopt. MAB algorithm is used in the state of food and activity to calculate user behaviour frequency and average calorie benefit

multiplication. [4] Nature inspired (NI) algorithms are based on the nature intelligence met in the survival, feeding and perpetuation of specific strategies of life forms but also on other artificial or natural phenomena [8]. NI algorithms were developed for both numerical and combinational optimization problems and are able to generate near-optimal solutions for computationally intensive optimization processes. [8]

1.1 Need

Today's generation are facing many health related problems like obesity, high blood pressure, skin problems etc. The busy life schedule brings out these issues of unhealthy life. Approximately 1.9 billion people worldwide are overweight and over 600 million of them are obese. [1] These conditions increase the risk of health problems, such as hypertension, type-2 diabetes, coronary heart disease and many more. Therefore, it is important to arrange composition and serving suggestion to obtain balanced nutrition. Balanced nutrition means fuelling ourselves with right things, right amount, and in the right time, to achieve a healthier body and immune to disease. [1] Food recommendation is one of the solutions to obtain optimal nutrition. A good recommendation can be achieved using appropriate optimization method.

1.2 Basic Concept

Food provides the energy and nutrients you need to be healthy. Nutrients include proteins, carbohydrates, fats, vitamins, minerals, and water. Not all the nutrients and other substances in foods that contribute to good health have been identified, so eating a wide assortment of foods helps ensure that you get all of the disease-fighting potential that foods offer. In addition, this will limit your exposure to any pesticides or toxic substances that may be present in a particular food. [2] Eating more fruit and vegetables, along with high fiber foods and low-fat dairy products daily, will improve your health. Calories plays an important role in people's diet as more calorie in their food can make them gain weight. Also, high calories diet can have major bad effects on your health. [2] So we need to arrange all the nutrition's in such a way that we would get the proper diet.

1.3 Applications

1. Primary target is to mitigate the health related issues commonly faced.
2. Can be used in several fitness and diet solution scenarios record and analyse the performance such as a Gym, Training Instruction, etc.
3. It helps user to get the nutrition values by eliminating the need of nutritionist.
4. It helps user to keep a track of his day to day routine and maintain regularity.

Chapter 2

Literature Survey

There are many recommendation systems available and are discussed are as follows:

- Fidelson Tanzil, Lili A. Wulandhari proposed the system which provides the user food options in accordance with the user's BMI, healthy immune system and calorie intake. The system filtered the food options on the basis of user's inputs. The optimal solution obtained from fitness function, which was the difference between nutrition needed and nutrition suggested must minimum as possible. In this paper, the result showed that ABC achieved 99.90% in giving a recommendation for portion and type of foods per day. [1]

- Neha Gaur, Archana Singh proposed the system which explores and recommends a model for systematic diet and healthy food. The system would help youth to maintain their healthy food habits which would increase their energy and efficiency of work. The system takes various parameters as age, genetic disease, gender and recommends the right amount of calorie intake considering various situations. [2]

- Anisio Lacerda, Adriano Veloso and Nivio Ziviani proposed the system which was focused on the important problem of adding value to the daily-deals recommendation. It introduces several criteria that can be used to sort customers based on aggregated statistics and past history of emails. The system showed that multi-armed bandit algorithm is extremely effective in sorting customers that are likely to click the e-mail. [3]

- Daphney–Stavroula Zois, the proposed system based on MAB formulations can be used among others to model medical tests performed to individuals This paper focused on designing on recommender system which assists the daily routinely diet selections depend on some nutrition guidelines. It takes the user's profile, food taken by and nutrition database and some additional knowledge base. [4]

- Xianneng Li, Huiyan Yang, Meihua Yang proposed the system which integrates variable neighbourhood search (VNS) into ABC (artificial bee colony) algorithm so

that the search ability under variable neighbourhood structures and local search is accelerated. It gives an idea of neighbourhood change and adaptive local search to significantly accelerate the optimization performance of ABC. [5]

- Sundus Ayyaz, Usman Qamar presented a neighbourhood selection approach using collaborative filtering method by comparing two neighbourhood methods, the k-nearest neighbours and the threshold-based neighbours to get the most favourable recommendations. The recommendations generated using collaborative filtering can be further improved by combining a flexible technique with collaborative filtering and implementing a hybrid approach. [6]

- Colin Patch, Bruce Gooch proposed an exercise data logging system that collects data. Logging exercise data can help the individual to keep track of their fitness progress and to plan an exercise history allows users to visualize their accomplishment as well as inactivity thus provide feedback and motivation. [7]

- Silviu-Ioan Bejinariu, Hariton Costin, proposed the system based on optimization problems, nature-inspired algorithms are able to generate near-optimal solutions faster than other optimization algorithms. ABC algorithm can be used for multimodal and multivariable optimization having the ability to avoid the local solutions and get the global one. [8]
- Mikhail Kamalov Vladimir Dobrynin proposed the system which shows the problem of choosing an algorithm that solves the optimization problem for to online data processing. The high accuracy of PMBGD and MBGD ranking algorithms for the tasks of homepage finding, name page finding, and topic distillation. [10]

Chapter 3

Existing System

The existing system of getting a diet plan is not automated. People need to visit their local dietician physically to know the required diet plan. The user has to wait for their appointment with the dietician. [2] The user might have to wait for long hours some times. This makes it very inconvenient for the users to get their diet plan. They have to wait just to get the information about what they should eat. There are lot of difficulties user has to face while searching for the suitable exercise according to parameters. [3] If the user is not regular in physical activity, then he/she is unable to track their activity data. This is not efficient when looked from an end user's point of view.

Chapter 4
Aim & Objective

4.1 Aim

Modern busy lifestyles are often at odds with the healthy aspirations of consumers who want to achieve wellness through good nutrition and exercise but limited time to exercise and dislike of food preparation and cooking, this culture is having a potentially dangerous effect on healthful diets and fitness as well. There is no such platform that gives expert advice as well as exercise activities. So, we come up with the idea of fitness solution which will help user to maintain healthy food habits and fitness of the user

4.2 Objective

Our main objective behind designing system is that user will get the single platform where they can enter their input parameters and accordingly the best suitable suggestion will be shown. User's input parameters can change with time, so system will help him/her getting better recommendation by selecting best nutrition values. One of basic objective to designing system is that any non-expert user can also get the recommendation about the food. Aim behind using artificial bee colony algorithm is, the performance from ABC was better than other techniques; although it uses fewer control parameters.

Chapter 5

Problem Statement

The long hours working style, wrong eating habits in people like fast food, unhealthy, junk food and excessive usage of media has caused various health related issues like Heart attack, stress, and hypertension. In daily busy schedule peoples don't get time for systematic and proper diet and better fitness exercises and also there are lots of options available over the internet that provides such all information and suggestions.

To overcome this problem, the idea is to provide optimal solution by using Recommender System Algorithm. Access from multiple systems with multiple different software allows the flexibility of not depending on a single source for information. Effective data saving as only the bare minimum required would be loaded as per the needs and selection. Intuitive and basic interface for access to anyone and everyone with minimum knowledge of diet as well as health while being user friendly to produce accurate results.

Chapter 6

Proposed System

The recommender system aims are to suggest proper diet and exercise to the user. Various steps involved in algorithm are input detection, BMI and BMR calculations, data comparison, data segmentation and extraction. The extracted data will be stored in a separate database and finally data will provide to user as per their requirements.

Figure 1. Represent the block diagram of Fitness Solution Recommendation System. The proposed system accepts inputs from the user like name, height, weight, age, BMI, gender, food type, exercise type etc. and gives the diet and exercise recommendations. For future recommendation, MAB algorithm is used. MAB algorithm uses the previous diet plan, exercise plan and recommend the user improved diet, exercise plan.

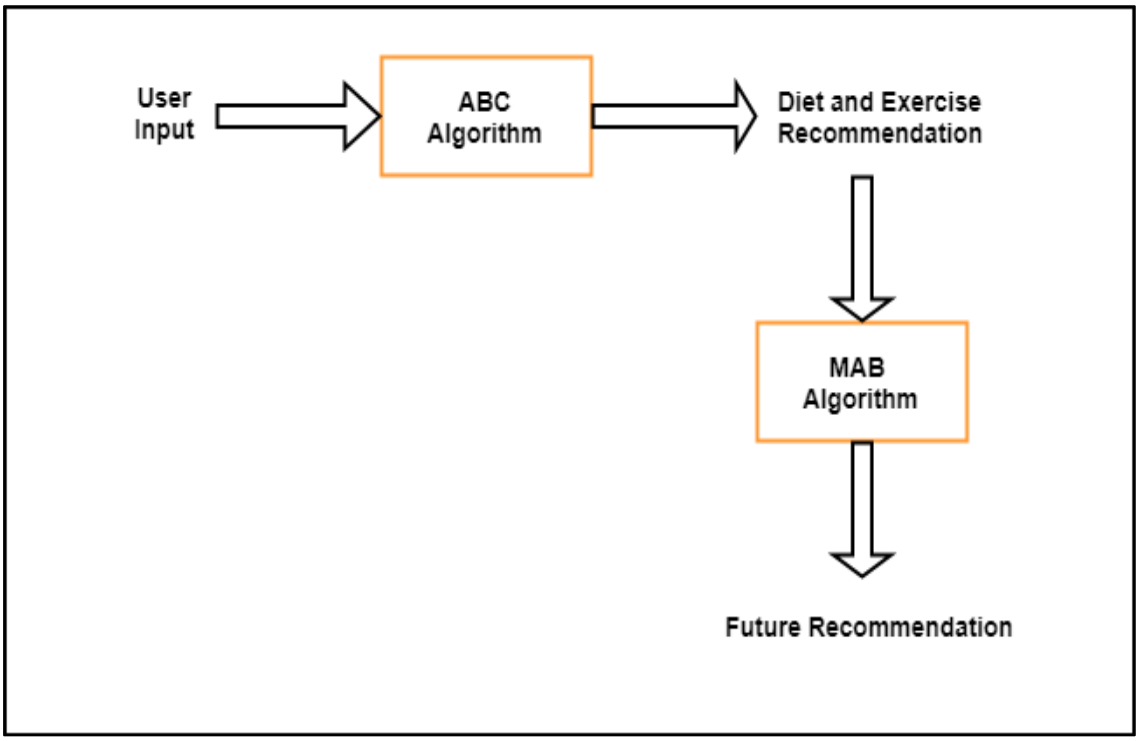


Figure 6.0.1working of proposed system

- The initial task is decomposed into two subtasks. Accept users Body measurements such as body weight, height, age, and activity level. These inputs are used to calculate the users BMI and BMR using formulas.

- After getting suitable inputs from user artificial bee colony algorithm it is used to suggest required data i.e. diet and exercise plan from our database to the user.
- The output which is obtained from the processing of ABC algorithm is used as input by MAB algorithm. This algorithm is used to optimize the previous diet and exercise plans. Future diet recommendation can be done through this method.

Chapter 7
Requirement Analysis

7.1 System Functions

7.1.1. User role

The work of the user is to login using their ID and password. New users have to register themselves first. Once the users have logged in then they have to provide valid inputs to the system. User should update his/her input weekly for the better prediction in future.

7.1.2 Administration role

The system administrator must be able to:

1. Continuously update the database and data set associated with the system.
2. Activate deactivate users accordingly allowing various access privileges.
3. Maintaining integrity of the data being constantly flowing in and out of the server.

7.3 Functional requirements

- Selection of duration for processing algorithms.
- The user can select Diet and Exercise related information according to his choice. This will enable the user to extract the data which is required by him.
- The filtered data for user's requirements is totally depends on the body measurements i.e. BMI and BMR which our system take from user as input. Hence it is the responsibility of user to enter perfect and valid data and also select the required option which will directly affect the accuracy of the data.

7.4 Non Functional Requirements

- The GUI for the system will be designed in such a way that a person not from a technical background can easily understand the functionality of the system.
- All the data necessary for output that we will take from food experts or diet recommender doctors and then we will put it manually inside our system database.

Chapter 8

Scope

8.1 Scope

In this modern day world where internet has become a common language across every human, the only restriction is device bound. In the stream of fitness, every application developed has primary focus on calculations input from a specific device isolating it from the circle of internet. With the applied system, access to specific profile of fitness gets a lot easier as user can gain access from varied access points and hardware.

With every other fitness technology either needs a physical tracker or manual entry of specific data can create a void. Information of very specific data or access to health tracker is not accessible to everyone easily which in return affects the user's commitment to fitness. The proposed system offers a broader spectrum for approach as no specific hardware tracker or diet related knowledge regarding contents would be needed to keep track of your fitness.

Manual input of data offers three prime advantages:

a) The data input is exact and there is no chance of false reading errors.

b) Fitness profile can be updated without any dependencies, anywhere.

c) Proposed system offers very basic form of input needed and further does the complex break down of diet by itself hence complete knowledge of your diet isn't necessary either.

8.2 Feasibility

The very first phase in any system developing life cycle is preliminary investigation. The feasibility study is a major part of this phase. A measure of how beneficial or practical the development of any information system would be to the organization is the feasibility study. The feasibility of the development software can be studied in terms of the following aspects:

- **Operational Feasibility:**

  Operational feasibility is the ability to utilize, support and perform the necessary tasks of system. To be operationally feasible system must fulfil the need. During design and Implementation phase, the proper engineering and management will be carried out.

- **Technical Feasibility:**

  Users will just need an internet connection and can access from anywhere. The browsers required will be chrome, safari, Firefox. Hardware requirements are minimum 512 MB RAM, and minimum of Intel Pentium IV processor. System will be feasible with any of windows Linux or MAC Operating system.

- **Economical Feasibility:**

  This system will be used by many people. As we are not buying any product or software or any license for implementing system, there is no concern about economical feasibility. The system will be economically beneficial in time and cost.

- **Legal Feasibility：**

  Legal Feasibility refers to any licensed product being used during the implementation of system. As we using Bootstrap we are using official software and its libraries during implementation.

- **Scheduling Feasibility：**

  Scheduling feasibility related the potential time frame and completion dates for all major activity within projects meet the deadlines decided. Gantt chart will be followed for proper flow of development of system.

Chapter 9

Methodology

The initial task is decomposed into two subtasks. Accept users Body measurements such as body weight, height and age, using these inputs our system will calculate the users BMI and BMR using particular formulas. Then the main goal of recommender system is to match proper data from database with calculated users BMI and BMR.

Project will undergo various System development life cycle as follows:

Stage 1:

In this System, we will focus on macronutrients. Macronutrients can obtain from dairy and milk products, vegetables, grains, non-veg, fruit and other foods. We introduced five foods category (DM, VG, GR, NV, FR, EX). Therefore, nutrition suggested (NS) can is written as the following equation:

NS = (x1 * DM) + (X2 * VG) + (x3 * GR) + (x4 * NV) + (x5 * FR) + (x6 * EX)

Where x1, x2, x3, x4, x5, x6 = Numbers of serving portion

Stage 2:

Then we have to calculate nutrition needed (NN). Nutrition needed can determine based on the Basal Metabolic Rate (BMR) and activity level. The value of BMR obtain using following equation:

- For Men

  BMR = 88.362 + (13.397 x weight) + (4.799 x height) − (5.677 x age)

- For Women

  BMR = 447.593 + (9.247 x weight) + (3.098 x height) − (4.330 x age)

Where weight in kilogram, height in centimetre, and age in years.

Stage 3:

The next step is to calculate energy requirement (ER) value with activity level to obtain total daily energy requirements. Activity level divided into five categories, namely: little or no exercise, light exercise, moderate exercise, heavy exercise, very heavy exercise.

ER is calculated by the equation as follow:

ER = BMR * Activity Factor

Activity Level	**Activity Factor**
Little or no exercise	1.2
Light exercise (1–3 days/week)	1.375
Moderate exercise (3–5 days/week)	1.55
Heavy exercise (6–7 days/week)	1.725
Very heavy exercise	1.9

Table 9.1 Activity Factor

Stage 4:

In this stage we have to divide energy requirement into amount energy needed for each nutrition such as carbohydrate, fat, protein. This research used 60% for carbohydrate, 15% for protein, and 25% for fat.

- Amount of energy needed for carbohydrate

  EC = ER * Carbohydrate Percentage

- Amount of energy needed for protein

  EP = ER * Protein Percentage

- Amount of energy needed for fat

  EF = ER * Fat Percentage

Where EC is energy needed for carbohydrate, EP is energy needed for protein, EF is energy needed for fat.

Stage 5:

In this stage, divide amount of energy needed for each nutrition into nutrition needed. This step is calculated by equation:

- Carbohydrate = EC / 4
- Protein = EP/ 4
- Fat = EF/ 9

NN = Carbohydrate + Protein + Fat

Where the result of carbohydrate, protein, fat in Gram.

Stage 6:

Now we have to apply ABC algorithm.

1) Initialize food source Xij

   $i \in \{1.....BN\}$

   $j \in \{1.....D\}$

   Where, BN = Employee Bees

   D = Dimension (no. of food groups)

2) Evaluate food source by using equation

   MIN (fitness = abs ($\sum j=0$ (NNj – NSj)))

   Where n = 3 (carbohydrates + fat +protein)

   NN = Nutrition Needed

   NS = Nutrition Suggested

j = Dimension

3) T= 1

   Where T= trial

4) Repeat

5) Produce new solution Vij for employee bee using equation:

   $Vij = Xij + \emptyset ij (Xij - Xkj)$

   $k \in \{1....BN\}$

   Where $\emptyset ij$ = random number between [-1, 1]

6) Again calculate minimum fitness function.

7) When food source reaches the limit exit from the loop. We use the same concept as in proposed system. Various steps involved in algorithm are input detection, BMR calculations, data comparison, data segmentation and extraction. The extracted data will be stored in a separate database and finally data will provide to user as per their requirements.

Chapter 10

Design Detail

10.1 Context Level Diagram

Context level diagram are diagrams used in systems design to represent all external entities that may interact with a system. The Context Level Diagram provides a conceptual view of the process and its surrounding input, output and data stores. The Figure 10.1 shows the overview of the system in which recommender system is in the middle and connected to both user and the database.

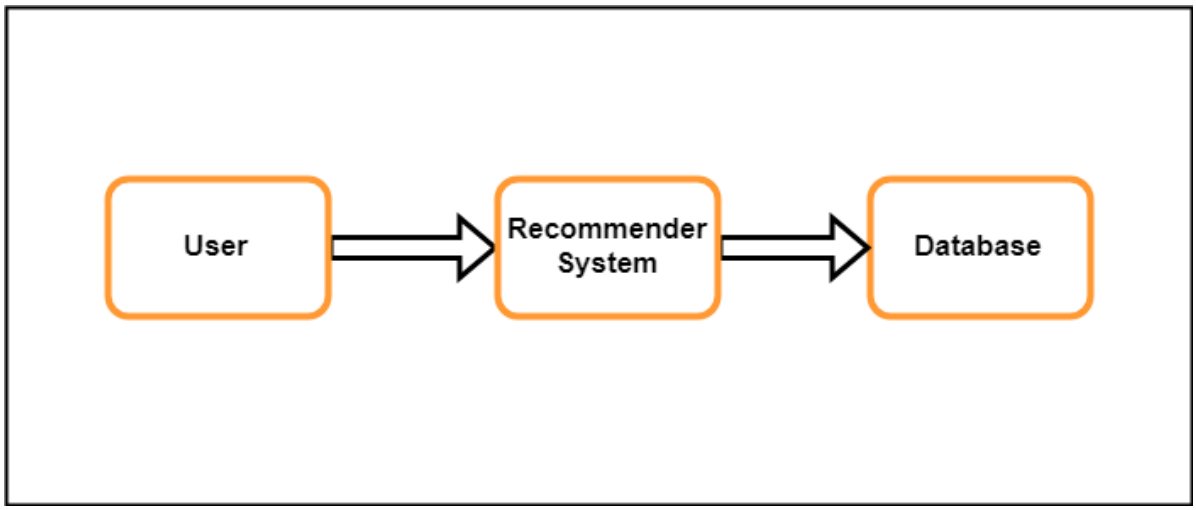


Figure 10.1 Context level Diagram for System

10.2 Data Flow Diagram

A Data Flow Diagram (DFD) is a graphical representation of the "flow" of data through an information system, modelling its process aspects. A DFD is often used as a preliminary step to create an overview of the system, which can later be elaborated. The Figure 10.2.1 and figure 10.2.2 show what kind of information will be given as input to the system and what the system will output.

10.2.1 Admin Data Flow Diagram (Level 1)

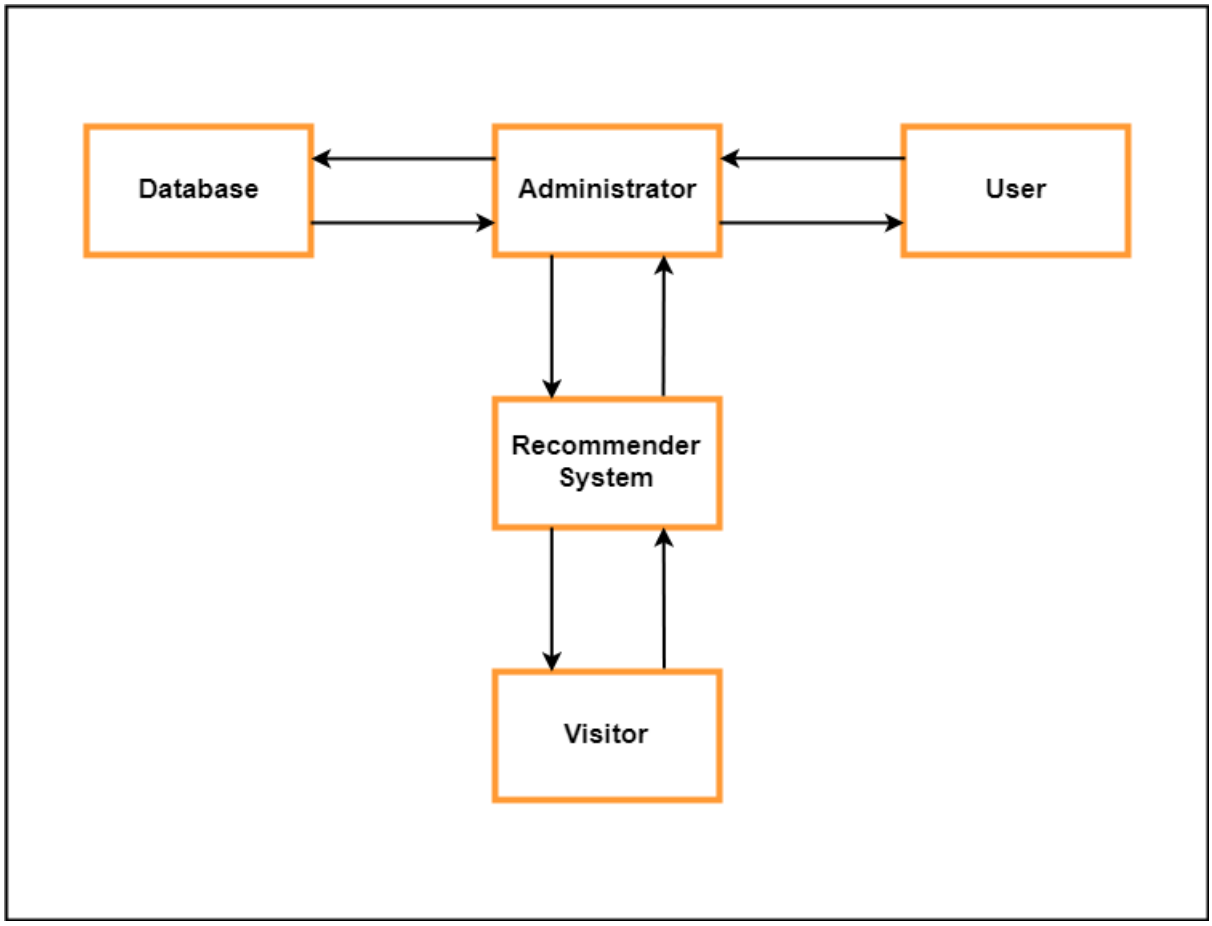


Figure 10.2.1 Level 1 DFD

10.2.2 User Data Flow Diagram (Level 2)

In Level 1 DFD the User enters the inputs and accordingly the system suggests the diet for it by checking in the Database. The system shows the list of recommended food and exercise for that particular user. As shown in fig (10.2.2)

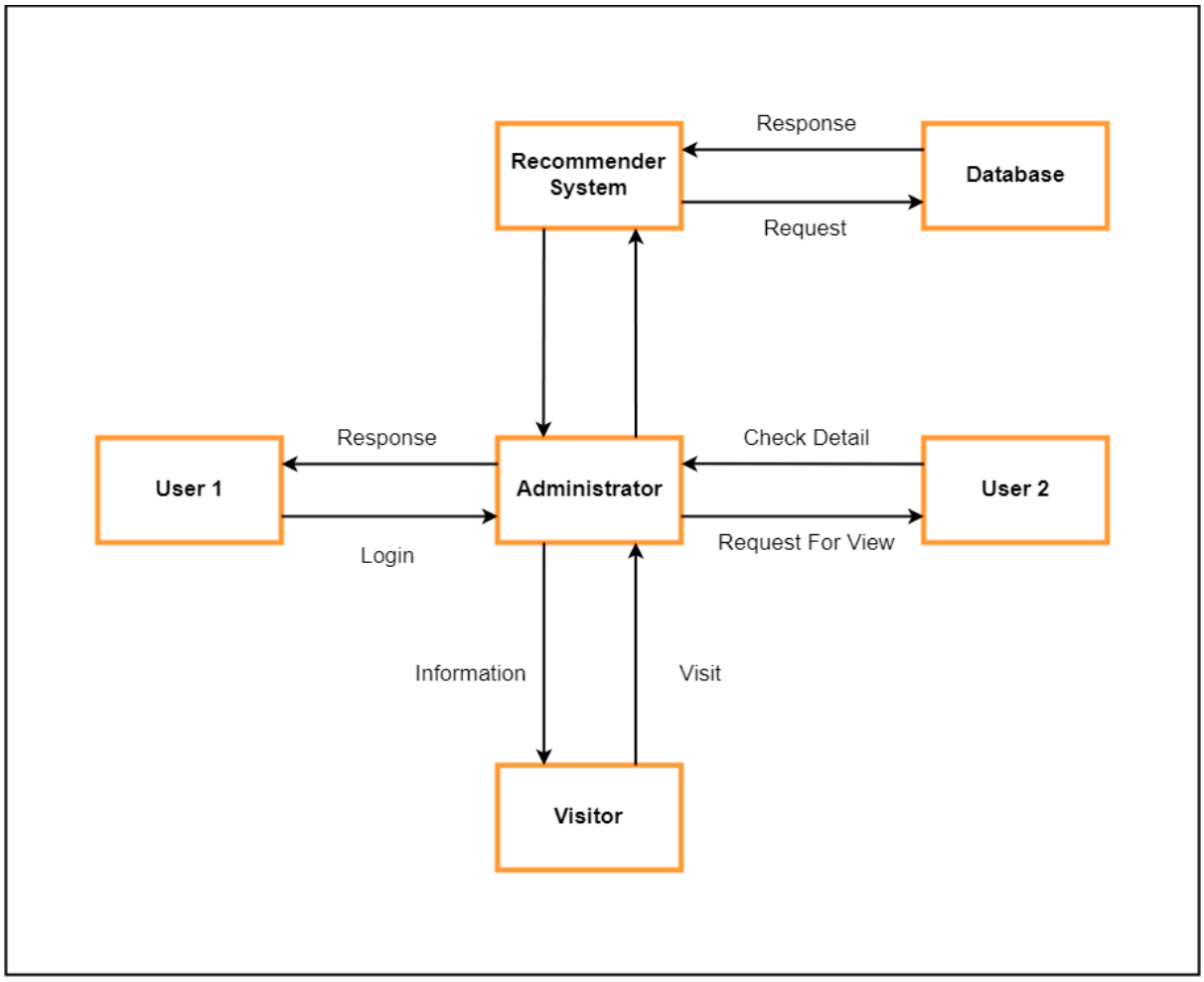


Figure 10.2.2 Level 2 DFD

10.3 Sequence Diagram

A Sequence diagram is an interaction diagram that shows how processes operate with one another and in what order. The Figure 10.3 below shows object interactions arranged in time sequence and the sequence of messages exchanged between the objects needed to carry out the functionality of the scenario.

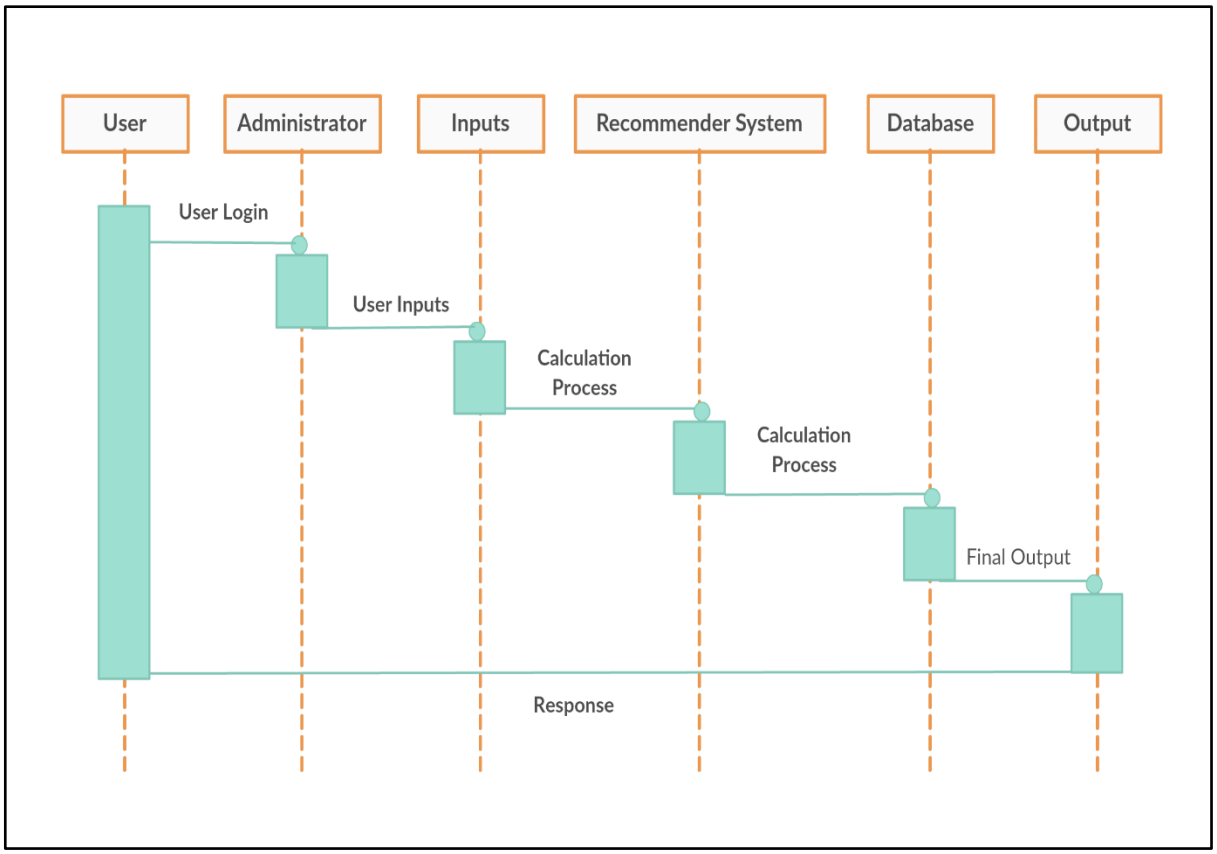


Figure 10.3 Sequence diagram for System Operations

10.4 ER Diagram

Activity diagrams are graphical representations of stepwise activities and actions. The Figure 10.4 models the overall flow of control in the system.

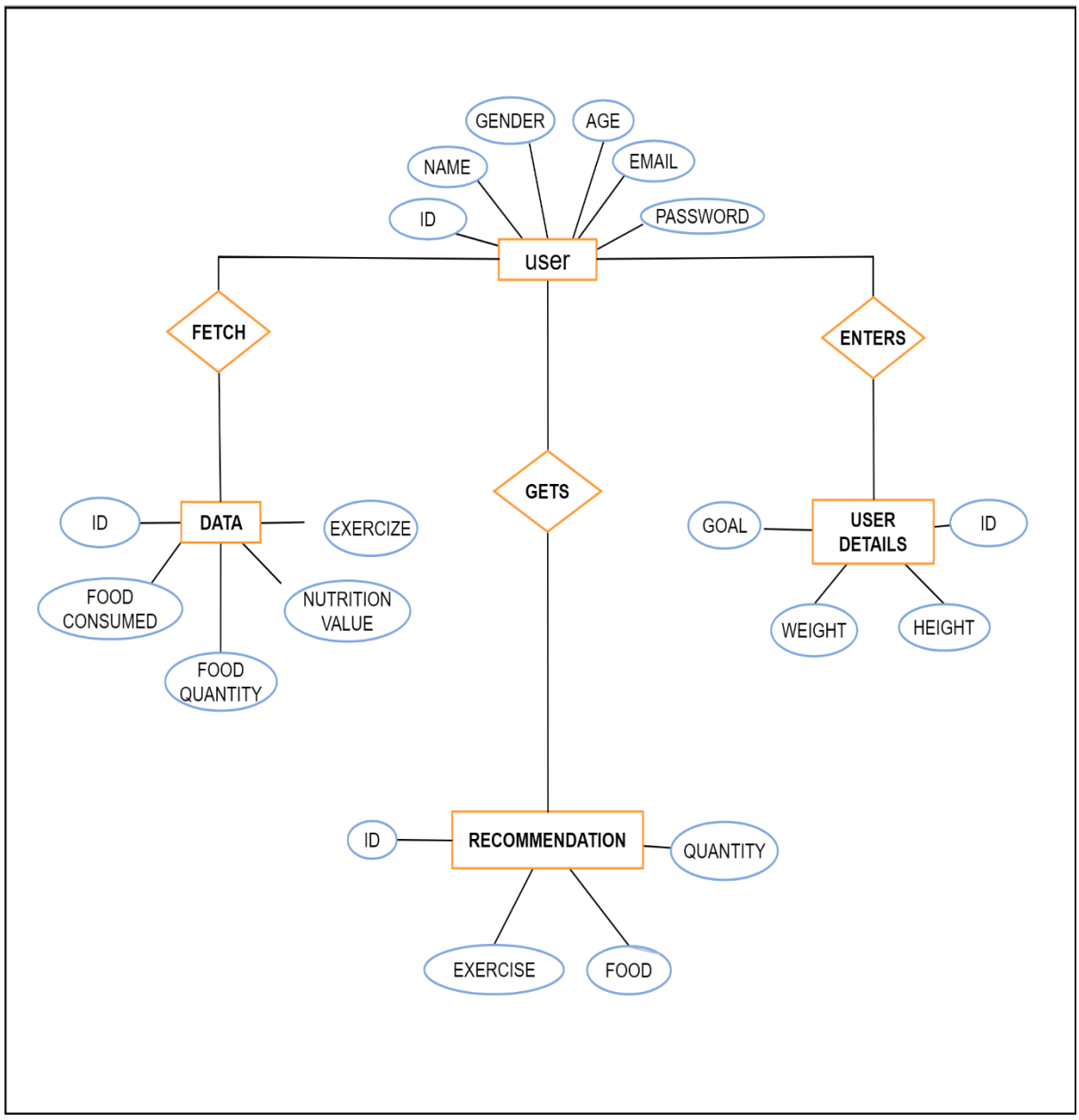


Figure 10.4 ER Diagram for System Operations

10.5 Use Case Diagram

A use case diagram at its simplest is a representation of a user's interaction with the system that shows the relationship between the user and the different use cases in which the user is involved. The Figure 10.5.1 and figure 10.5.2 identify the different types of users of a system and the different use cases.

10.5.1 User Use Case

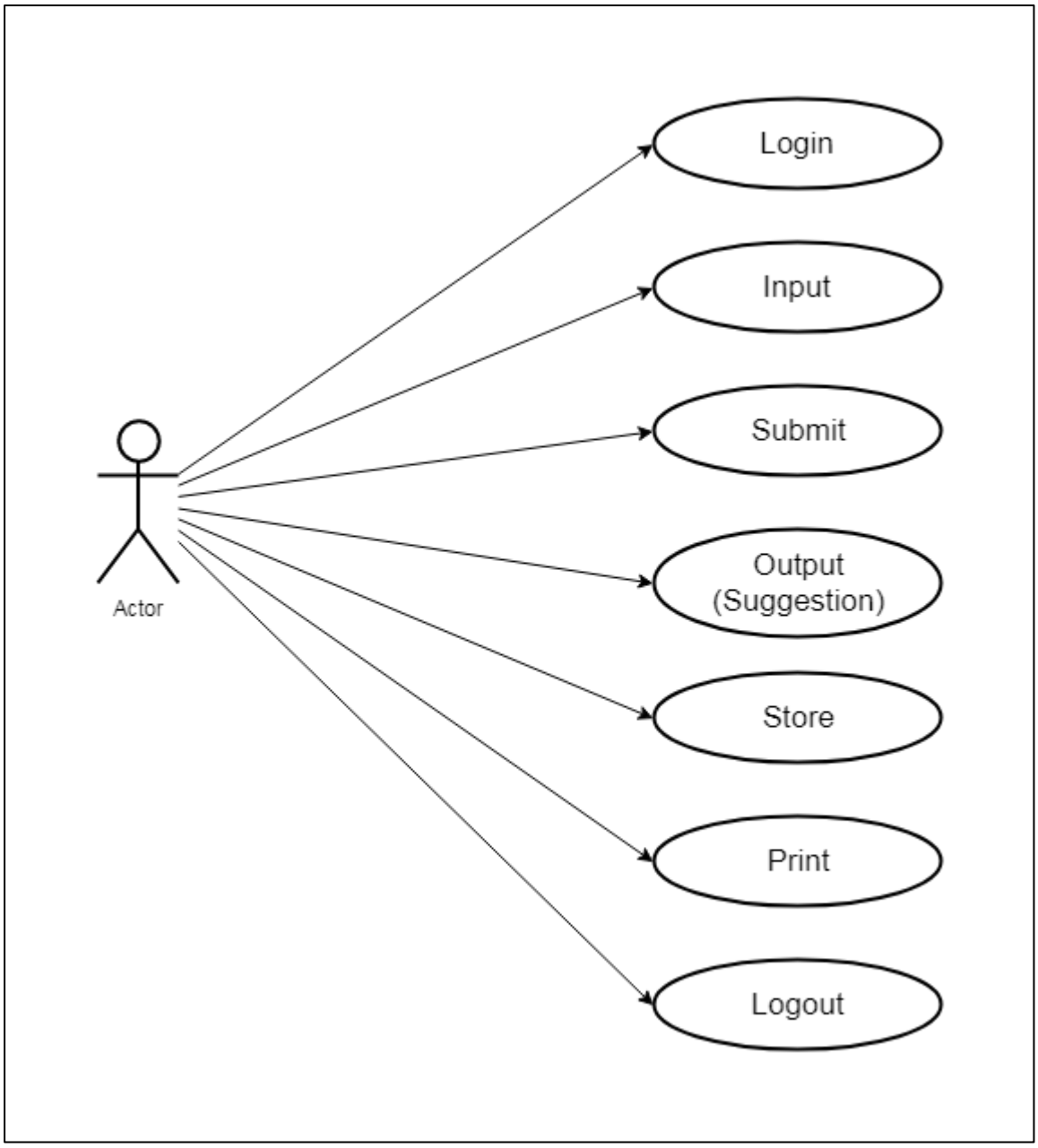


Figure 10.5.1 Use Case diagram outlining User Action

10.5.2 Admin Use Case

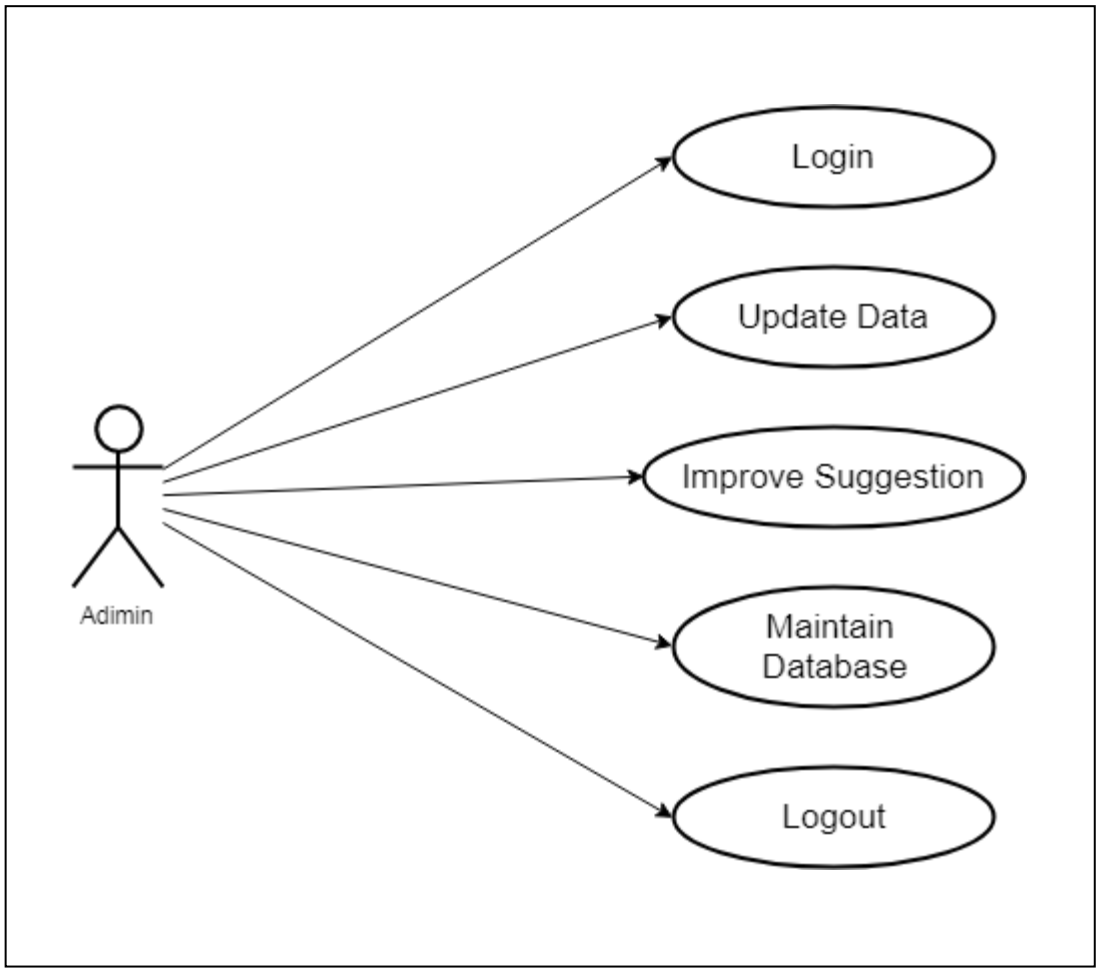


Figure 10.5.2 Use Case diagram outlining Admin Action

10.6 Control Flow Diagram

A control flow diagram (CFD) is a diagram to describe the control flow of a business process, process or review. The Figure 10.6 depict a subdivision to show sequential steps, with if-then-else conditions, repetition, and/or case conditions

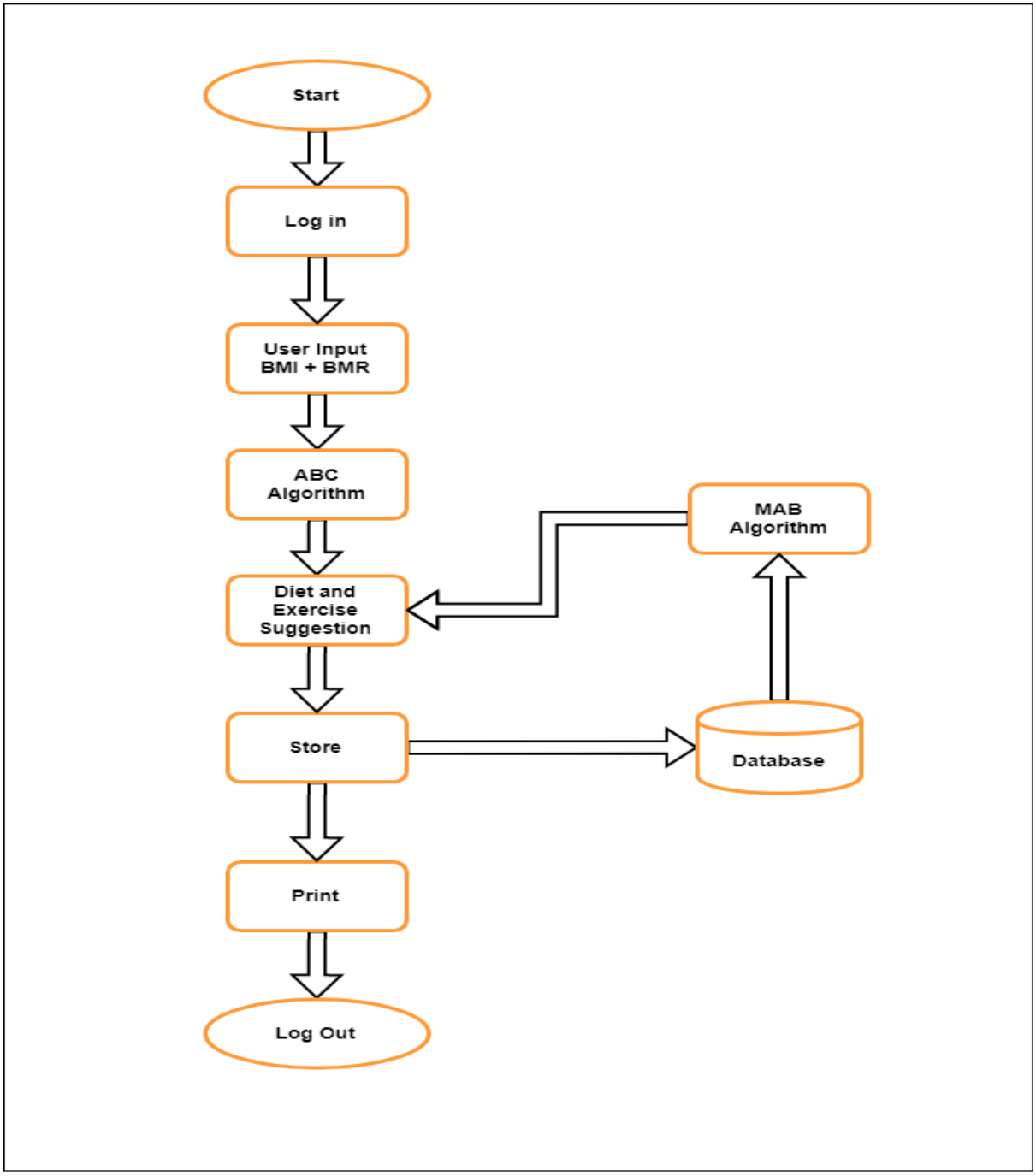


Figure 10.6 Control Flow Diagram

Chapter 11

Implementation & Experimental Setup

11.1 Hardware and Software Requirements

11.1.1 Hardware:

- Intel Pentium IV or Further Processor: The system we designed will be used by people having minimum of Intel Pentium processor. This is because maximum number of people can use the system.

- Minimum 512 MB RAM: Minimum of 512 MB ram is required for user to Access the system smoothly. A system with 512 or more RAM will give a better performance.

11.1.2 Software:

- **HTML, CSS, Bootstrap, and PHP-MySQL:** HTML is used for designing basic building block and structure of GUI. CSS is used for making styling. And Bootstrap is used for making the GUI more attractive and user friendly.

- **Latest Browser (e.g. Google Chrome, Firefox, etc.):** The system will be run on every browser including Google chrome, Firefox Internet Explorer so more and more users can be beneficial with the system.

- **Operating System (Windows XP and above):** System will be applicable for the windows operating system XP and above like Windows 7, Windows 8, Windows 8.1, Windows 10 etc. Systems will also run on UNIX and Linux Platform as well.

- **XAMPP:** It is free and open source web server solution stack package developed by apache. XAMPP stands for Cross-platform (X), Apache (A), Maria DB (M), PHP (P), and Perl (P). It is developer tool for website designers, programmers to generate and test their work without any access to internet.

11.2 Data Set

Dataset consists of foods ID, foods name and food nutrients description, exercise ID, exercise name, exercise description is as shown in table 1. The data is collected by using Google forms of different age groups of 15 to 65 years. Total 750 records collected by continuous follow-up of six months. The selection of attributes has done by the expert advice.

Sr.No	Attribute Name	Description
1	User ID	Assign unique identification number to the user.
2	Name	System accepts username
3	Age	System ask for the age of user
4	Height	System asks for user height which will be used while calculating BMI
5	Weight	System asks for user weight which will be used while calculating BMI
6	Gender	System accepts Male or Female values and later that will be used in calculating BMR
7	BMI	Calculated by the system automatically with the help of height and weight of the user.
8	BMR	Calculated by the system automatically by considering height, weight and gender of the user.
9	Food Type	Food type accepts the different values which Include carbohydrate, fat, protein.
10	Exercise Type	Exercise type considered as Low level, medium level, and high level.

Table 11.2 Dataset attributes of Fitness Solution Recommendation System

11.3 Simulation and working environment

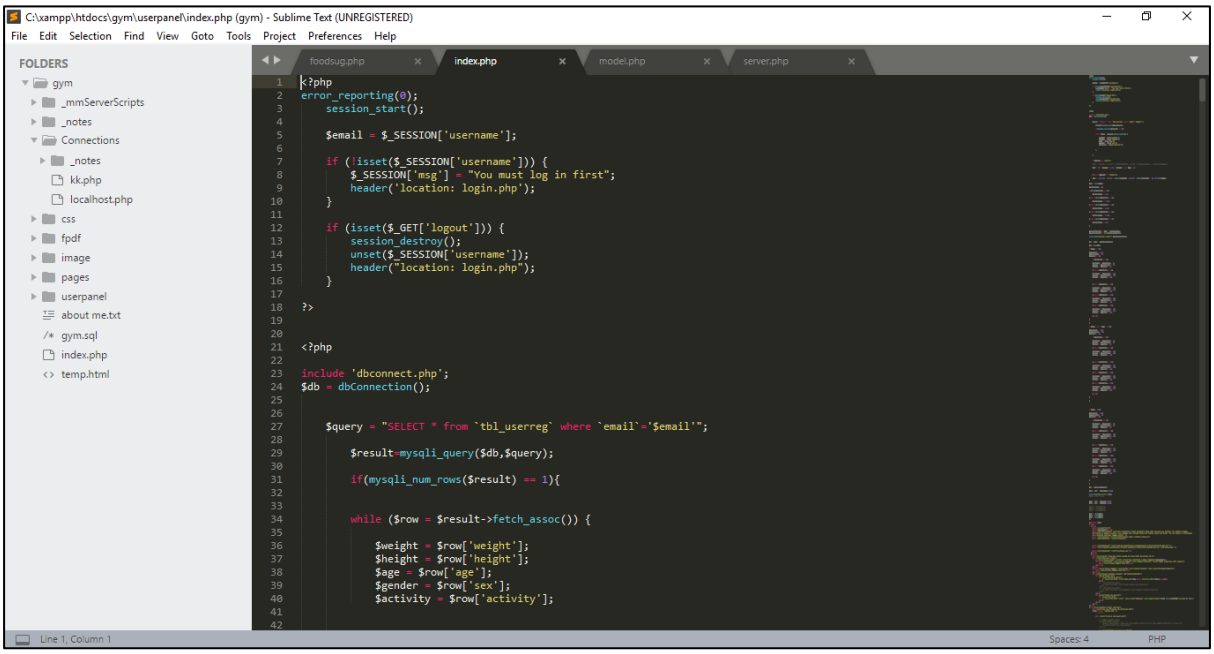


Figure 11.3.1 Working Environment

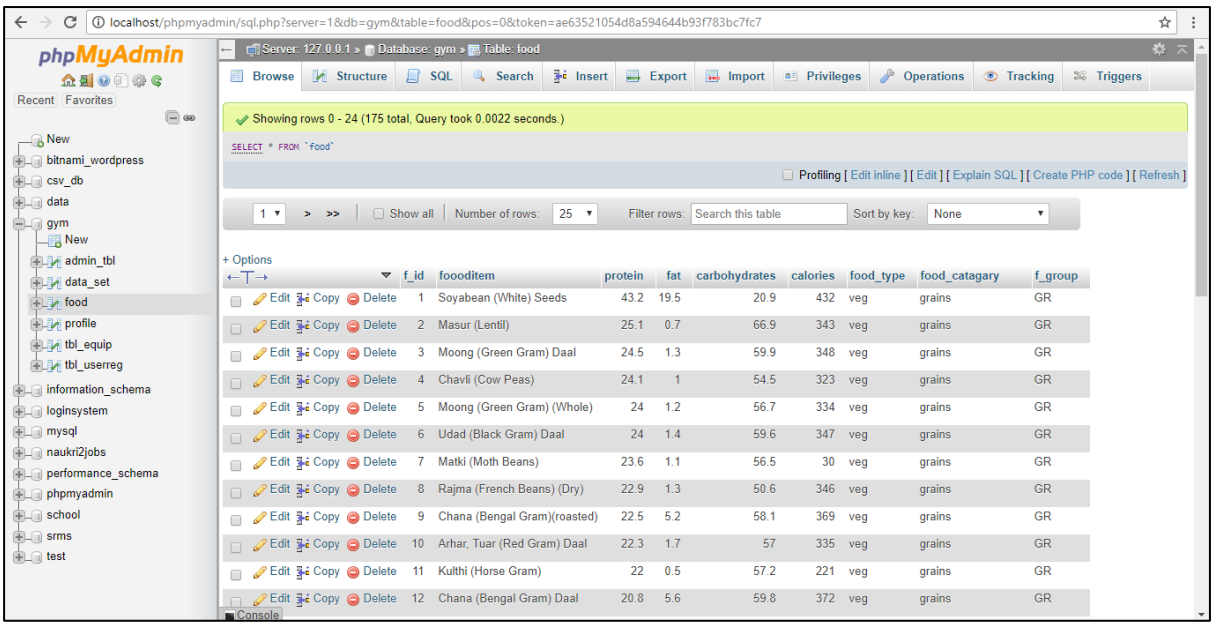


Figure 11.3.2 Simulation Environment

11.4 Gantt Chart

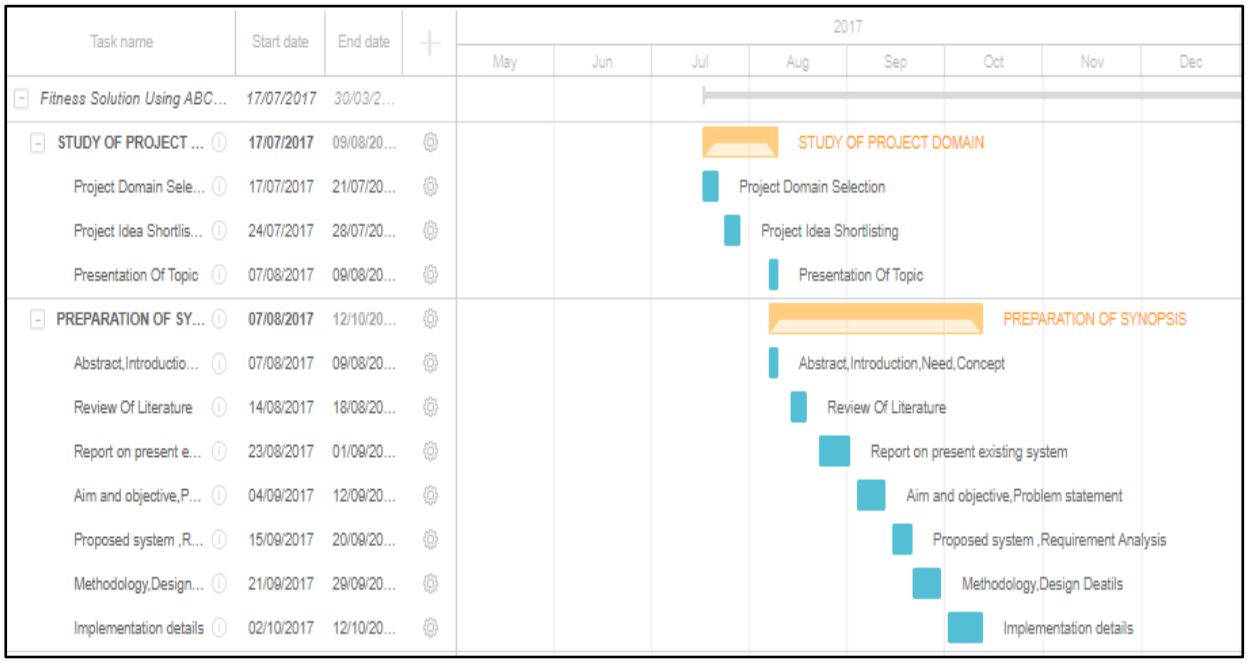


Figure 11.4.1 Gantt chart for synopsis

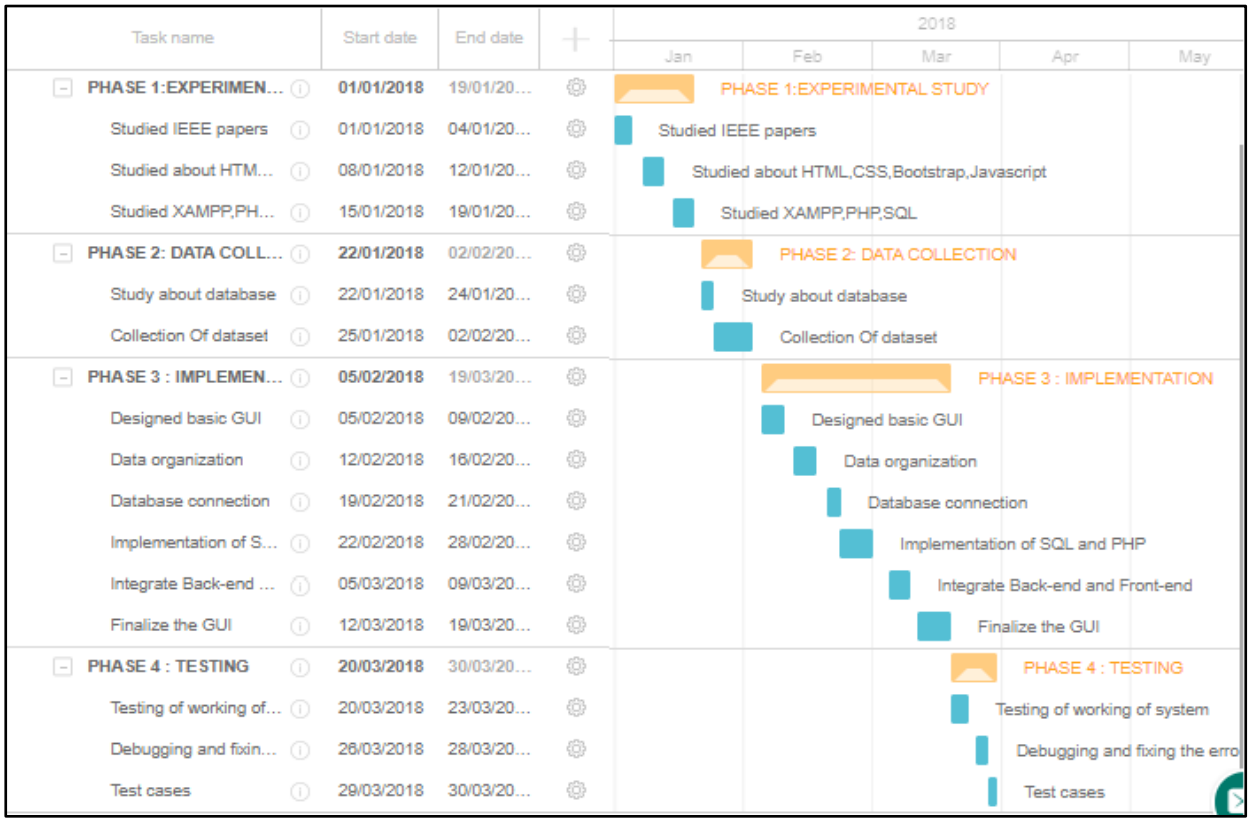


Figure 11.4.2 Gantt chart for implementation

Chapter 12

Testing

System testing is a critical phase implementation. Testing of the system involves hardware devise and debugging of the computer programs and testing information processing procedures. Testing can be done with text data, which attempts to stimulate all possible conditions that may arise during processing. If structured programming Methodologies have been adopted during coding the testing proceeds from higher level to lower level of program module until the entire program is tested as unit. The testing methods adopted during the testing of the system were unit testing and integrated testing.

12.1 Unit Testing

A program represents the logical elements of a system. For a program to run satisfactorily, it must compile and test data correctly and tie in properly with other programs. Achieving an error free program is the responsibility of the programmer. Program testing checks for two types of errors: syntax and logical. Syntax error is a program statement that violates one or more rules of the language in which it is written, an improperly defined field dimension or error messages generated by the computer. Logic error deals with incorrect data fields, out of range items, and invalid combinations. Since diagnostics do not determine logic errors the programmer must examine the output carefully.

When a program is tested, the actual output is compared with the expected output. When there is a discrepancy the sequence of instructions must be traced to determine the problem the process is facilitated by breaking the program down into self-contained portions, each of which can be checked at certain key points. The idea is to compare program values against desk-calculated values to isolate the problem. Unit testing has been performed on all the form modules. The syntax and logical errors have been corrected then and there. All the syntax errors have been rectified during compilation.

12.2 Integration Testing

Programs are invariably related to one another and interact in the total system. Each program is tested to see whether it conforms to related programs in the systems. Each portion of the system is tested against the entire module with both the test data and the

live data before the entire system is tested as a whole. Integration testing is systematic techniques for conducting the program structure. While at the same time conducting tests to uncover errors associated with the interfacing. The objectives are to take unit tested modules and to build a program that has been dedicated by design.

12.3 Test Cases

1. Test Cases for Login Page
2. Test Cases for Registration Page
3. Test Cases for User Parameters

Sr no	Test case	Description	Input	Expected result	Actual result	Status
1	Login id	Check entered login id should valid	akshay (valid input)	Should Accept	Accepted	Pass
2	Login id	Check entered login id should valid	Vinit#$% (invalid input)	Should not accept	Not accepted	Pass
3	Password field	Check entered Password field should valid	valid input	Should Accept	Accepted	Pass
4	Password field	Check entered Password field should valid	invalid input	Should not accept	Not accepted	Pass
5	Password field	Reset after refresh page	Refresh page	Should reset	Not Reset	Fail

Table 12.3.1 Test Cases for Login Page

Sr no	Test case	Description	Input	Excepted result	Actual result	Status
1	First name field	Check first name field only accept characters.	“akshay”	Input should accept	Input accepted	Pass
2	Last name field	Check last name field only accept characters.	“chougule ”	Input should accept	Input accepted	Pass
3	Email id	Email id must contain ‘@’symbol and postfix’.com’	akshay35chougul@gmail.com	Input should accept	Input accepted	Pass
4	Password	Password field must fill	Enter password	Input should accept	Input accepted	Pass
5	Register button	After click on register button validation must perform	Click on register button	Validation should perform	Validation perform	pass

Table 12.3.2 Test Cases for Registration Page

Sr no	Test case	Description	Input	Excepted result	Actual result	Status
1	Age	That field only take input as number	24	Input should accept	Input accepted	Pass
2	Weight	That field only take input as number	60	Input should accept	Input accepted	Pass
3	Height	That field only take input as number	165	Input should accept	Input accepted	Pass
4	Gender	Checks at a time select one option only	Select moderate level option	Input should accept	Input accepted	Pass
5	Activity Level	Checks at a time select one option only	Select moderate level option	Input should accept	Input accepted	Pass

Table 12.3.3 Test Cases for User Parameters

12.4 Observation

1) Performance:

Gives the result according to the inputs and gives the recommended diet as well as exercises.

2) Accuracy:

The accuracy of the output is 60%. To give the accurate expected output, it should give the output in terms of column names.

Chapter 13

Result & Analysis

This section outlines the work flow of the system and analyzing the end result of the system architecture.

Logging in the System: Initially a user must login the system using the correct credentials. Upon authorization by the system; the user is directed to the default home page termed dashboard.

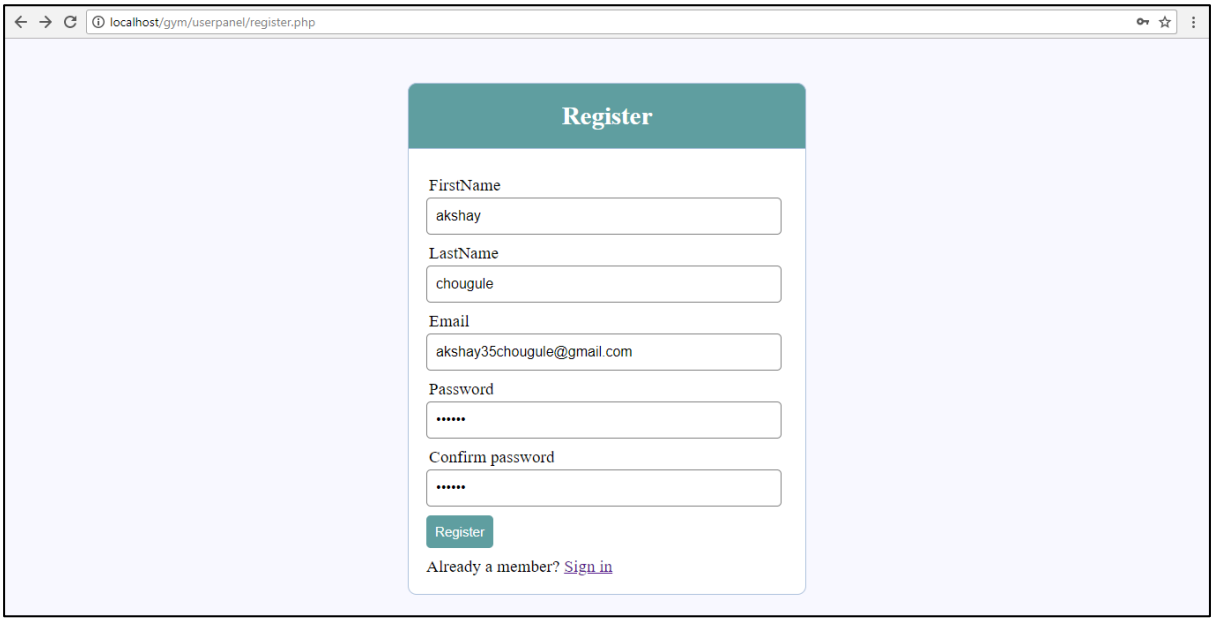


Figure 13.1 Registration Page

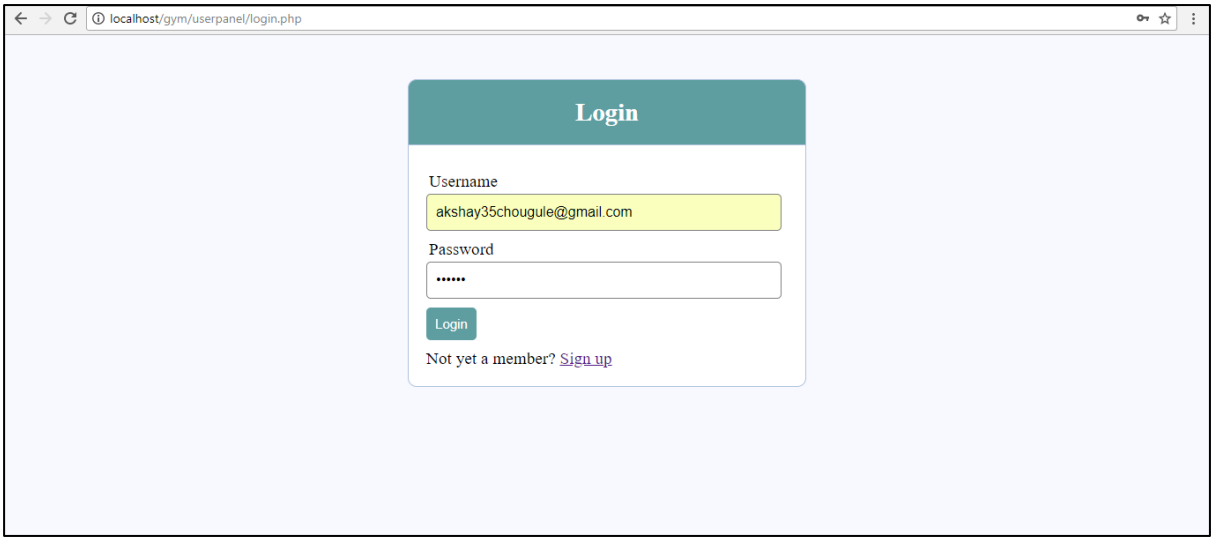


Figure 13.2 Login Page

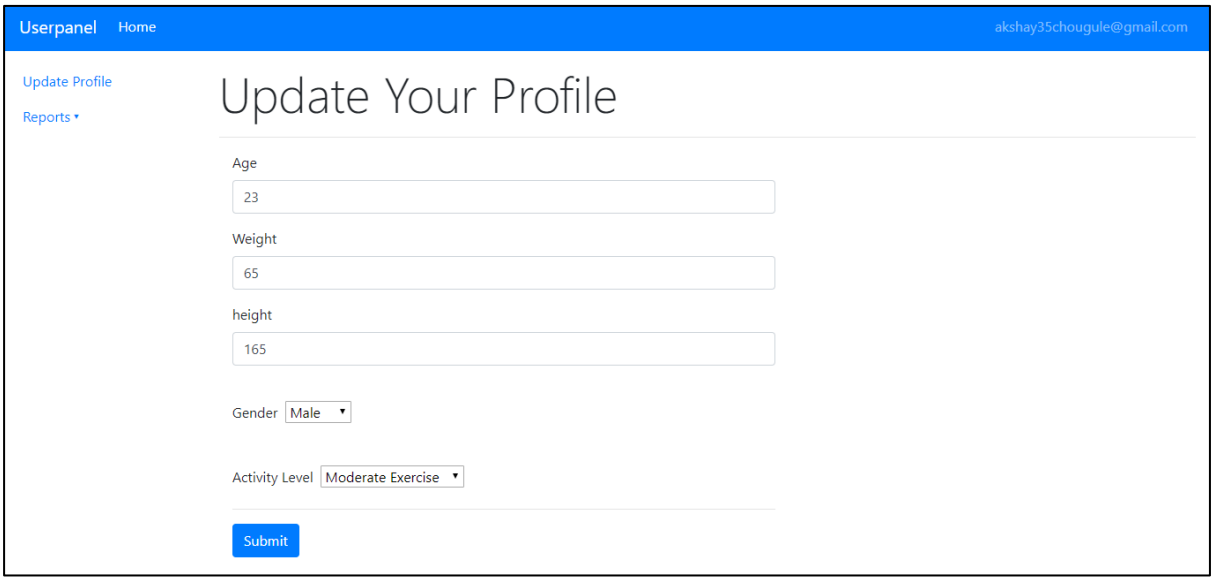


Figure 13.3 User Input Page

Figure 13.4 Users dashboard

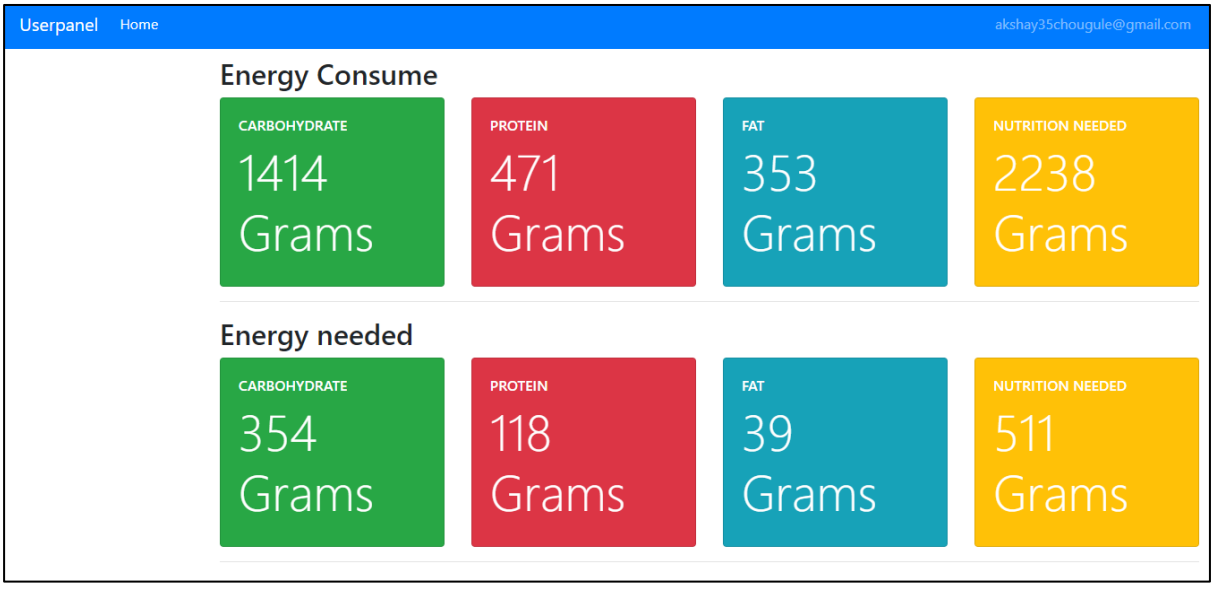
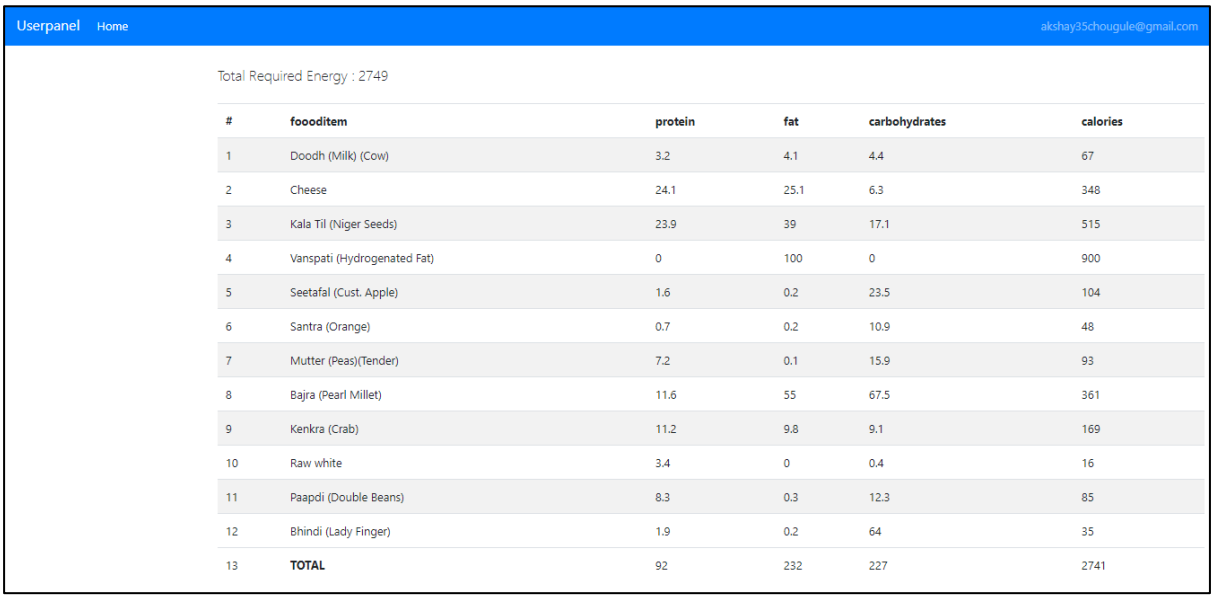


Figure 13.5 Energy Requirement Calculation



#	foooditem	protein	fat	carbohydrates	calories
1	Doodh (Milk) (Cow)	3.2	4.1	4.4	67
2	Cheese	24.1	25.1	6.3	348
3	Kala Til (Niger Seeds)	23.9	39	17.1	515
4	Vanspati (Hydrogenated Fat)	0	100	0	900
5	Seetafal (Cust. Apple)	1.6	0.2	23.5	104
6	Santra (Orange)	0.7	0.2	10.9	48
7	Mutter (Peas)(Tender)	7.2	0.1	15.9	93
8	Bajra (Pearl Millet)	11.6	55	67.5	361
9	Kenkra (Crab)	11.2	9.8	9.1	169
10	Raw white	3.4	0	0.4	16
11	Paapdi (Double Beans)	8.3	0.3	12.3	85
12	Bhindi (Lady Finger)	1.9	0.2	64	35
13	**TOTAL**	92	232	227	2741

Figure 13.6 Food Suggestion

Chapter 14
Advantages and Limitations

14.1 Advantages

- Data input and updating from multiple input sources.
- Dependency on many aspects such as a physical device is overcome.
- Ease of use with intuitive user interface and system for comfortable access to layman.
- Pushing out regular updates is carried out without the involvement of user completely. This ensures that every user is always observing the most updated data.

14.2 Limitations

- User has access to profile only as long as he has access to internet. This causes a major dependency as to view the most updated http software, internet would be needed.
- Manual entries create a dependency on the user for input of data. The recommender system can only give constant updates and suggestions as long as user keeps updating his data.
- Regularity and diet precision is required so as to obtain most ideal suggestions.

Chapter 15

Future Scope

With the dawn of decentralization and Internet of Things (IoT) the proposed system is subjected to be run on web 3.0. With the access to an internet built on the TOR network from ground up in order to provide truly decentralized servers.

This in return enhances security and brings down the cost of running. This will enable the system to become self-sufficient.

Aggregation of all the fitness solutions around your location conveniently presented to you as a section of this system itself. This enables users on the go to be aware of their surroundings regarding fitness solutions.

Chapter 16

Conclusion

This work proposed a solution which is based on the people lifestyle, food habits and way of living standards. The recommender system keeping various significant parameters as age, weight, height, genetic disease and gender recommended the proper food diet and exercise considering various situations in order to keep the people healthy. The appropriate metabolism is essential to be healthy and for that, it is necessary to know what is good and bad for our health. So we have proposed a solution which will recommend healthy food options available to an individual depending upon the food calorie needed for that body. In future, the proposed system will be implemented by using the sequential hybrid system which will use ABC algorithm followed by MAB algorithm. This work can add more value by adding the concept of mining the data to suggest the type of food and exercise based on the region.

Chapter 17

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ACKNOWLEDGEMENT

It gives us great pleasure in presenting this system report titled: 'Fitness Solution Using ABC and MAB Algorithm'.

On this momentous occasion, we wish to express our immense gratitude to the range of people who provided invaluable support in the completion of this system. Their guidance and encouragement has helped in making this system a great success.

We express our gratitude to our project guide Prof. Aruna Pavate, who provided us with all the guidance and encouragement and making the lab available to us at any time.

We would like to deeply express our sincere gratitude to our respected Principal Dr. Srikanth Kallurkar and the management of Atharva College of Engineering for providing such an ideal atmosphere to build up this project with well-equipped library with all the utmost necessary reference materials and up to date Computer Laboratories

We are extremely thankful to all staff and the management of the college for providing us all the facilities and resources required.

Publication details of Research Paper

Title: Fitness Solution Using Hybrid Algorithm

Conference Name (Detail): International Conference On Innovative and Advanced Technologies in Engineering

Date of Publication: March, 2018

Journal Name: IOSR

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